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Consequence of changes in herd size and densities for the contingency planning

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The objective of the current work was to evaluate whether the effects and control of foot-and-mouth disease (FMD) spread would differ following the structural changes to the Danish agricultural sector from now until 2030.

Following the predicted structural changes, a new farm file was created, representing active farms in 2030. Index herds were randomly selected from the created farm file. The farm file contains information about the herd ID, coordinates, number of animals and movement rates. DTU-DADS and ISP were used to simulate the spread of FMD in Denmark in 2030. Following discussions with the industry, low risk contacts are assumed to increase with increasing herd size, and thus the number of low risk contacts was increased by 50%. All other input values were assumed to stay the same.

Four different control scenarios were run: 1) A basic scenario representing current EU and Danish control strategies, 2) pre-emptive depopulation of susceptible herds in a radius of 0.5, 1, 1.5 and 3 km around the detected herds, 3) suppressive vaccination in a radius of 1, 2, 3, and 5 km around the detected herds 4) protective vaccination in similar radiuses to suppressive vaccination. Depopulation and vaccination started after detecting 10 infected herds.

Compared to the current situation, future FMD outbreaks are, based on median values, predicted to be shorter and cheaper. Nonetheless, we also predicted that extreme epidemics would be larger and more expensive.

Epidemiologic results predict that pre-emptive depopulation and protective vaccination are good choices to control the disease in future populations. However, economically, protective vaccination is predicted to be too expensive in Denmark, and thus pre-emptive depopulation and suppressive vaccination are better options to control FMD in the future.

It is also important to mention that enlarging the depopulation and vaccination zones might not be a good option, because direct costs would increase and resources problems might arise leading to larger economic damage.

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